Part II
2. CONTRACTOR QUALIFICATIONS AND QUALITY TASKS

2.1 Scope

This chapter outlines the general qualifications and quality responsibilities of the Contractor. As used in this chapter, the "Contractor" is the steel fabricator, responsible for the shop fabrication of the structural steel, or the steel erector, responsible for all field erection and field welding. The general contractor or construction manager is not the "Contractor" as used in this section, unless performing some or all of the duties of fabricator or erector.

The Owner should ensure that the Contractor has established and put into practice an adequate Quality Control Plan (QCP). The Quality Assurance Plan should provide oversight to the Contractor's QCP. This may range from simple records and report reviews to a full testing and inspection program, depending upon the effectiveness of the Fabricator's or Erector's QCP, and the requirements of both the Quality Assurance Plan and the Building Code.

The Owner should be involved in the selection or approval of the Contractor. In order to establish the necessary level of Quality Control (QC) and Quality Assurance (QA) for a particular project, it is necessary to establish the level of experience and competence of the Contractor. Adjustments to the QA Plan may be appropriate after the Contractor has been selected.

> *Commentary: Although Section 1702.2 of the IBC exempts work performed by "Approved Fabricators" from some inspections, the use of "certified" or "qualified" fabrication shops, in lieu of requiring independent Quality Assurance provided by the Owner, is not recommended. However, a fabrication shop that is certified or qualified by a recognized program, such as the American Institute of Steel Construction (AISC) Quality Certification Program, does provide a level of assurance that the fabricator has the capability of providing good fabrication performance.*

2.2 Contractor Quality Control Plan

The Contractor must establish, implement and maintain a suitable QCP for in-process quality control of the work.

The Contractor's QCP should, as a minimum, include the following:

- designation and qualifications of project QC personnel,
- designation and qualifications of personnel responsible for supervision of the work,
- Contractor's written QC and procedures manual,
- Contractor's written weld repair procedures, and
- Contractor's Nondestructive Testing (NDT) procedures and NDT personnel training records.

The Contractor's QCP must be in writing, enabling others to make an effective evaluation of its adequacy. The Contractor should also make periodic reviews, at least annually, of the QCP to verify its adequacy and to determine that it is being followed at all levels of the Contractor's operations.

The Contractor's QC function should be isolated from the production department, and the QC Manager should report directly to a high level company officer to avoid conflicts of interest with production.

2.3 Contractor's Statement of Responsibility

Prior to the commencement of work on the structural system, the Contractor should submit to the Owner, and the authority having jurisdiction, a written statement of responsibility containing the following:

- acknowledgment of awareness of the special requirements contained in the Quality Assurance Plan,
- acknowledgment that control will be exercised to obtain conformance with the Contract Documents approved by the authority having jurisdiction,
- procedures for exercising control within the Contractor's organization, the method and frequency of reporting, and the distribution of reports, and
- identification and qualifications of the persons exercising such control and their positions in the organization.

Commentary: In many cases, one firm performs fabrication, defined as work performed in a fabricating shop, and another firm performs erection, defined as work performed at the jobsite. Often, the fabrication and erection are under one contract, but the erection portion is sublet to an erection specialty subcontractor. When a single firm directly performs both functions, the management of each operation is often separate, and therefore the fabrication and erection operations, and the statement of responsibility, should be evaluated as though coming from separate organizations.

This Section 2.3 is similar to that recommended in FEMA-302, Section 3.2.2, and adopted as IBC Section 1705.3.

2.4 Certification Programs

To assist in evaluating the adequacy of a Contractor's qualifications, Contractor certification under one or more of the programs indicated in this section may be considered.

2.4.1 AISC Quality Certification

The American Institute of Steel Construction, Quality Certification Program, is a voluntary program under which owners, engineers and building officials can evaluate the quality of steel

fabricators. Steel fabricators are evaluated on the basis of their overall quality control program, judging the general management, engineering and drafting, purchasing, shop operations and quality control functions of the individual plant. Fabricating companies having more than one plant are certified on a plant-by-plant basis. The AISC Quality Certification Program is used to determine if the plant "has the personnel, organization, experience, procedures, knowledge, equipment, capability and commitment to produce fabricated steel of the required quality for a given category of structural steel work."

There are two categories of certification for steel buildings, plus two categories for steel bridge structures. Conventional Steel Building Structures, previously known as Category I, include, but are not limited to:

- small public service and institutional buildings (for example, schools),
- shopping centers,
- low-rise truss and beam / column structures,
- light manufacturing plants,
- miscellaneous and ornamental iron fabricated to AISC Specifications,
- warehouses, and
- sign structures.

Complex Steel Building Structures, previously known as Category II, include, but are not limited to:

- large public service and institutional buildings,
- high rise buildings,
- stadiums,
- auditoriums,
- heavy manufacturing plants,
- power plants (fossil, non-nuclear),
- metal producing and metal rolling facilities,
- crane girders,
- bunkers and bins,
- chemical processing plants, and
- petroleum processing plants.

Fabricating plants certified for Complex Steel Building Structures are automatically certified for Conventional Steel Building Structures.

The AISC Quality Certification Program, Category MB - Metal Building Systems, refers to pre-engineered metal buildings. This category of certification includes a review of the design procedures used by the manufacturer of the building system in designing the structure, as well as the manufacturer's fabrication capabilities and systems.

2.4.2 AISC Erector Certification

The American Institute of Steel Construction, Erector Certification Program, is a voluntary program under which the construction industry can evaluate the quality of steel erectors. Steel erectors are evaluated on the basis of their overall quality control program, judging the management and operations of the erector.

The AISC Erector Certification Program is used to determine if the erector "has the personnel, organization, experience, procedures, knowledge, equipment, capability and commitment to erect fabricated steel of the required quality for a given category of structural steelwork."

There are two categories of certification for structural steel erectors. These are Certified Steel Erectors and Certified Advanced Steel Erectors.

A Certified Steel Erector may provide services on the same types of structures included under fabricator certification for Conventional Steel Building structures, as described in Part II, Section 2.4.1. In addition, a Certified Steel Erector may provide services for steel frame buildings up to ten stories in height.

A Certified Advanced Steel Erector may provide services on the same types of structures for fabricator certification for Complex Steel Building Structures, under Part II, Section 2.4.1. In addition, Certified Advanced Erectors may provide services for repair and upgrade of existing steel buildings.

2.4.3 Building Code Evaluation Services

The International Conference of Building Officials (ICBO) Evaluation Services, Inc. and Building Officials and Code Administrators (BOCA) Evaluation Services, Inc. provide evaluations of various manufacturers and products. Under ICBO Evaluation Services, steel fabricators are listed as Fabricators of Prefabricated Buildings and Components (064). BOCA Evaluation Services listings of steel fabricators and steel fabrications are contained in Division 5, but no specific category exists for structural steel fabricators.

2.4.4 Alternatives to Certification

2.4.4.1 International Standardization Organization (ISO) 9000

The use of *ISO 9000* or related credentials of the steel fabricator may be considered as an alternative to certification programs such as the AISC Quality Certification Program or ICBO Evaluation Services, as described above. A review of the fabricator's program and the audits conducted is advisable.

Commentary: Few fabricators have presently sought such ISO certification.

2.4.4.2 Jurisdiction Evaluation

Some local jurisdictions, such as the cities of Los Angeles and Houston, have programs in place to evaluate steel fabricators. Before relying on such evaluation programs, the Owner or Owner's designated representative should review the adequacy of such programs to qualify the Contractor for the type of work being undertaken.

Commentary: Although some jurisdictions exempt from inspection work performed in approved shops, this practice is not recommended.

2.4.4.3 Individual Evaluation

The Owner or a designated representative may evaluate the fabricator and erector individually to ascertain their levels of experience and skill, and to evaluate their Quality Control Plans. Such evaluations should be undertaken by personnel experienced in the field of structural fabrication or erection, including material control, welding, and bolting. Recommended checklists for evaluation of fabricators and erectors are presented in Figures 2-1 and 2-2, respectively.

When inspection or Nondestructive Testing (NDT) is performed by the Contractor (the fabricator or erector) as a part of the Quality Control function, the qualifications of the individuals performing such inspection or NDT should meet the same standards as the individuals performing Quality Assurance. It is not expected that the Contractor, as a firm, has the same qualifications or certifications as a Quality Assurance Agency performing such work, but it is important that the actual work be done in a satisfactory manner.

2.5 Contractor Obligations

The Contractor should cooperate fully with requests from inspection and testing personnel for access to the connections and joints to be inspected or tested. This includes beam and column turning in the shop, weld backing removal when NDT indicates a rejectable condition, and access to platforms or scaffolding as required to perform the work safely. When such services are required, the inspection must be performed in a timely manner so as not to hinder production or require duplication of effort.

The Contractor is responsible for all necessary corrections of deficiencies in material and workmanship. The Contractor should comply with requests of the Inspector to correct deficiencies, when such corrections are required by the Engineer or other designated responsible party. The NDT Technician should be apprised of any repairs made by the Contractor. Disputes regarding acceptance, rejection, repair and replacement of welds should be resolved by the Engineer or designated design professional.

Fabricator Evaluation Checklist

Note: This list is adapted from AISC Quality Certification for Complex Steel Building Structures. A more complete checklist is available from AISC, upon request.

Management

1. Does management review project quality requirements prior to production?

2. Does management assign or contract for project activities to suitably qualified personnel?

3. Does management select or create necessary quality procedures for the work?

4. Are special project quality requirements (for example, material controls, weld restrictions) communicated to plant departments?

5. Are fabrication and erection requirements (adjustment needs, erection aids, sequencing of NDT) and priorities reviewed prior to production?

6. Is shop supervision conversant with current provisions of AWS and AISC specifications?

7. Has the fabricator previously fabricated structures of similar complexity?

8. If fabrication is subcontracted to another fabricator, is the subcontractor evaluated and approved in a similar manner?

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Figure 2-1 Fabricator Evaluation Checklist

Fabricator Evaluation Checklist

Engineering and Detailing

1. Is there a qualified person supervising in-house detailing, and evaluating and coordinating outside detailing?
2. Does the company have capable in-house staff or consultants qualified by registration or experience?
3. Are requests for information documented?
4. Are detailed drawings checked by qualified personnel?
5. Are all detail drawings reviewed or approved by the Engineer?
6. Is there a current library of standards and specifications?
   - AISC
     - *Manual of Steel Construction,* including Volume II Connections
     - *Seismic Provisions for Structural Steel Buildings*
     - *Code of Standard Practice*
     - Quality Criteria and Inspection Standards
   - ANSI/AWS
     - *D1.1 – Structural Welding Code – Steel*
     - A5.xx – specifications for electrodes and shielding gases being used
   - ASTM
     - *Volume 1.04 – Steel-Structural,* or separate specifications for the material used
     - *Volume 1.08* or *15.08 – Fasteners,* or separate specifications for the material used
   - RCSC
     - *Specification for Structural Joints Using ASTM A325 or A490 Bolts*
   - Applicable building codes

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Figure 2-1 Fabricator Evaluation Checklist (continued)

Fabricator Evaluation Checklist

Structural Steel

1. Are controls established to ensure adequate identification of incoming purchased items?
2. Are mill test reports kept on file?
3. Is material inspected for conformance to *ASTM A6*?
4. Is a written procedure used to provide identification of steel grade, and where required, heat numbers and material test reports for special requirements?
5. Is the grade of material and marking verified prior to fabrication, during fabrication, and restocking?

Welding

1. Are all electrodes, fluxes and shielding gases checked upon receipt for conformance to purchasing documents?
2. Are manufacturer's certifications of conformance kept on file?
3. Are welding electrodes, flux, and shielding gases stored properly and identified?
4. Are flux and rod ovens adequate and operating according to AWS specifications?
5. Are wire-feed welding machines (FCAW, GMAW, SAW) periodically checked to ensure correct current and voltage readings, and is a record kept?
6. Is SMAW welding equipment in use in acceptable operating condition?
7. Does the fabricator have mechanically-guided burning equipment?
8. Have welding personnel been qualified to AWS requirements?
9. Is a welder identification system in place and used?
10. Do welders inspect their welds to AWS workmanship provisions?
11. Are approved written WPSs in close proximity to, and used by, the welders?
12. Is a check made to ensure that approved WPSs are disseminated and followed in the shop?
13. Does the fabricator have a competent welding technician, supervisor or consultant available on call to resolve welding problems?

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Figure 2-1 Fabricator Evaluation Checklist (continued)

Fabricator Evaluation Checklist

Bolting

1. Are all bolts, nuts and washers checked upon receipt for conformance to purchasing documents?
2. Are manufacturer's certificates of conformance kept on file?
3. Are fasteners suitably stored and identified by production lot?
4. Does the fabricator have adequate and accurate punching equipment, drilling equipment, or both?
5. Is a bolt tension calibration device available for pre-installation testing and wrench calibration?
6. Are written bolt installation and tightening procedures available and used?

General Fabrication

1. Does the fabricator have adequate and accurate material cutting and finishing equipment?
2. Does the fabricator have material handling equipment, including cranes, to move material without damage?
3. Is fabrication in accordance with approved shop detail drawings?
4. Is fabrication in accordance with Contract Documents and specifications?

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Figure 2-1 Fabricator Evaluation Checklist (continued)

Fabricator Evaluation Checklist

Quality Control

1. Is there a written Quality Control Plan?
2. Is workmanship checked throughout the fabrication process?
3. Are Quality Control procedures followed?
4. Is inspection in accordance with the company inspection procedure?
5. Is a record kept of all inspections, such as by noted detail drawings?
6. Do all pieces receive a final inspection, and is a record kept of this inspection?
7. Are shop inspectors trained and qualified to perform inspection?
8. Do inspectors have the following equipment available: tapeline, welding gages, tag system?
9. Are there adequate procedures for coordination with outside inspectors and NDT technicians?
10. Is there a separation of responsibility between production and Quality Control?
11. Does Quality Control have the authority to stop the work, and the responsibility to inform the operating supervisor of non-conforming work?
12. Is there a functioning, written procedure for the disposition of non-conforming material or work?

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Figure 2-1 Fabricator Evaluation Checklist (continued)

Erector Evaluation Checklist

Note: This list is adapted from AISC Quality Certification for Complex Steel Building Structures and from the AISC Erector Certification Program.

Management

1. Does management review project quality requirements prior to erection?
2. Does management select or create necessary quality procedures for the work?
3. Are special project quality requirements (for example, material controls, weld restrictions) communicated to purchasing and field supervision?
4. Does management assign or contract for project inspection to suitably qualified personnel?
5. Are erection requirements (adjustment needs, erection aids, sequencing of NDT) and priorities reviewed prior to erection?
6. Are field superintendents and foremen conversant with the current provisions of AWS and AISC specifications?
7. Has the erector previously erected structures of similar complexity?
8. If erection or inspection is subcontracted to another firm, is the subcontractor evaluated and approved in a similar manner?

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Figure 2-2 Erector Evaluation Checklist

Erector Evaluation Checklist

Project Engineering

1. Is there a qualified person supervising in-house project engineering and coordinating outside engineering services?
2. Are requests for information, and responses, documented?
3. Is there a current library of standards and specifications?
    - AISC
        - *Manual of Steel Construction,* including Volume II Connections
        - *Seismic Provisions for Structural Steel Buildings*
        - *Code of Standard Practice*
        - Quality Criteria and Inspection Standards
    - ANSI/AWS
        - *D1.1 – Structural Welding Code – Steel*
    - RCSC
        - *Specification for Structural Joints Using ASTM A325 or A490 Bolts*
    - Applicable building codes

Fabricated Structural Steel

1. Are controls established to ensure adequate identification of delivered items?

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Figure 2-2 Erector Evaluation Checklist (continued)

Erector Evaluation Checklist

Welding

1. Are all electrodes, fluxes and shielding gases checked upon receipt for conformance to purchasing documents?
2. Are welding material manufacturer's certifications of conformance kept on file?
3. Are welding electrodes, flux, and shielding gases stored properly and identified?
4. Are electrode ovens adequate and operating according to AWS specifications?
5. Are electrode ovens placed in reasonable proximity to the welding operations?
6. Are wire-feed welding machines (FCAW, GMAW, SAW) periodically checked to ensure correct current and voltage readings, and is a record kept?
7. Is SMAW welding equipment in use in acceptable operating condition?
8. Does the erector have suitable thermal cutting, air arc gouging, grinding and hole-reaming equipment?
9. Have welding personnel been qualified to AWS requirements?
10. Is a welder identification system in place and used?
11. Do welders inspect their welds to the workmanship provisions of the applicable AWS specifications?
12. Are approved written weld procedures in close proximity to and used by the welders?
13. Is a check made to ensure that approved welding procedures are disseminated and followed?
14. Does the erector have a competent welding technician, supervisor or consultant available on call to resolve welding problems?

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Figure 2-2 Erector Evaluation Checklist (continued)

Erector Evaluation Checklist

Bolting

1. Are all bolts, nuts and washers checked upon receipt for conformance to purchasing or shipping documents?
2. If supplied by the erector, are manufacturer's certificates of conformance kept on file?
3. Are fasteners suitably stored and identified by production lot?
4. Is a bolt tension calibration device available for pre-installation testing and wrench calibration?
5. Are written bolt installation and tightening procedures available and used?

General Erection

1. Does the erector have erection equipment, including cranes, to move material without damage?
2. Is a complete set of erection drawings and shop detail drawings maintained at the jobsite?
3. Are project specifications or summaries of specifications and special instructions kept at the jobsite?
4. Is a complete set of erection procedures maintained at the jobsite?
5. Is erection in accordance with approved erection plans and procedures?
6. Is erection in accordance with Contract Documents and specifications?

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Figure 2-2 Erector Evaluation Checklist (continued)

Erector Evaluation Checklist

Quality Control

1. Is there a written Quality Control system?
2. Is workmanship checked throughout the erection process?
3. Are Quality Control procedures followed?
4. Is inspection in accordance with the company inspection procedure?
5. Is a record kept of all inspections, such as by noted detail drawings or erection drawings?
6. Do all connections receive a final inspection, and is a record kept of this inspection?
7. Are field inspectors trained and qualified to perform inspection?
8. Do inspectors have the following equipment available: tapeline, welding gages, tag system?
9. Are there adequate procedures for coordination with outside inspectors and NDT technicians?
10. Is there a separation of responsibility between production and Quality Control?
11. Does Quality Control have the authority to stop the work, and the responsibility to inform the field superintendent of non-conforming work?

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Figure 2-2 Erector Evaluation Checklist (continued)